MANSION TRUSS BRIDGE
(Bridge No. 6904)
Spanning the Staunton River at Virginia Route 640
Altavista Vicinity
Campbell County
Virginia

HAER No. VA-106

HAER
VA
16-ALTAV,
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Northeast Region
U.S. Custom House
200 Chestnut Street
Philadelphia, PA 19106

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VA
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HISTORIC AMERICAN ENGINEERING RECORD
MANSION TRUSS BRIDGE
(BRIDGE NO. 6904)

HAER No. VA-106

LOCATION: Virginia Route 640 over the Staunton River, Altavista vicinity, Campbell and Pittsylvania counties. USGS Straightstone, VA Quadrangle, Universal Transverse Mercator Coordinates: 17.656120.4109360

DATE OF CONSTRUCTION: 1903

BUILDER: Brackett Bridge Company, Cincinnati, Ohio

PRESENT OWNER: Virginia Department of Transportation

SIGNIFICANCE: The Mansion Truss Bridge is a representative example of a pin-connected steel Camelback truss, supported by concrete-filled steel cylinder piers. The truss and piers are typical of late nineteenth- and early twentieth-century factory-manufactured bridges.

PROJECT INFORMATION: The Mansion Truss Bridge was recorded in 1993-1994 by the Cultural Resource Group of Louis Berger & Associates, Inc., Richmond, Virginia, for the Virginia Department of Transportation (VDOT). The recordation was undertaken pursuant to provisions of a Programmatic Memorandum of Agreement (Draft) among the Federal Highway Administration, VDOT, the Virginia SHPO, and the Advisory Council on Historic Preservation concerning management of historic metal truss bridges in Virginia. Project personnel included Richard M. Casella, Architectural Historian; Ingrid Wuebber, Historian; and Bruce Harms, Photographer.

DESCRIPTION

Mansion Truss Bridge (VDOT Bridge No. 6904) consists of two pin-connected steel through truss channel spans and fifteen steel deck beam approach spans. The bridge carries Virginia State Route 640 in a northeast-southwest direction over the Staunton River, connecting the counties of Campbell and Pittsylvania, Virginia. It is 2.2 miles north of the junction of Virginia Routes 640 and 633 and approximately 4 miles east of the town of Altavista (Figure 1). The overall dimensions of the bridge approaches and spans are: north approach, 137' 4" with seven deck spans; north truss, 151'; south truss, 182'; and south approach, 147' 4-1/2" with eight deck spans. The total length of the bridge is 619'.

At the point of the bridge, the riverbed is approximately 300' wide, with the two trusses an average of 47' above the riverbed. The east and west trusses span floodplains at an average height of 21' and 17', respectively. The depth of the river fluctuates with discharges from Smith Mountain Dam, varying from 3' at its lowest level to 11' or greater. The bridge is situated in a valley surrounded by forested mountains.

The two trusses are Camelback trusses, a variation of a Parker truss defined by a top chord with a total of five slopes. The Parker truss is a Pratt truss with polygonal top chords. All members of the bridge are steel, joined with pinned, riveted, or threaded connections. Both trusses are 16' wide overall. The north truss has a maximum height of 28' and an overall length of 151', with eight panels, each 18' 10-1/2" wide. The south truss is 30' high at its maximum and 182' 3/4" long, with nine panels, each 20' 2-3/4" wide (Figures 2 and 3).

Top chords and inclined end posts on both trusses are riveted H-sections consisting of side channels with flanges turned out, top plates, and bottom stay plates. The north truss top chords measure 12" x 8-1/2" overall, built with 1/4" x 12" top plate, 8" x 2-1/2" channels, and 4" x 12" x 1/4" bottom stay plates spaced 36" on center. The south truss top chords measure 14" x 10-1/2" overall, built with 1/4" x 14" top plate, 10" x 2-1/2" channels, and 4" x 14" x 1/4" bottom stay plates spaced 36" on center. Both trusses rest on plate and roller-type bearings and fixed bed-plate bearings, which measure 12" x 20" on the north truss and 14" x 22" on the south truss. Bottom chords consist of paired loop-welded eye-bars. The bottom chords on the north truss are of three sizes: chords at panels one and two measure 3" x 5/8"; chords at the third panel are 3-1/2" x 3/4"; and chords at panel four are 4" x 3/4". The bottom chords on the south truss are of four sizes: chords at panels one and two are 4" x 3/4"; chords at the third panel are 4" x 7/8"; chords at panel four are 4" x 1"; and the center panel chords are 4" x 1-1/8".

Both trusses have riveted box-section bar-lattice posts. The posts on the north truss are 11" wide by 5-1/2" deep overall, made up of two 5" x 1-3/4" channels with flanges turned out, spaced 7" apart, and connected by 1-1/2" x 3/16" single bar-lattice. The posts on the south truss

are 12-3/4" wide by 7-1/2" deep overall, made up of two 7" x 2" channels with flanges turned out, spaced 8" apart, and connected by 1-1/2" x 3/16" single bar-lattice.

Diagonal panel braces on both trusses consist of doubled flat bars with loop-welded eyes. The dimensions of the north truss diagonals in panel two are 2-1/2" x 3/4", and in panels three and four, 1-1/2" x 1/2". The south truss diagonals in panel two are 3-1/2" x 5/8", and in panels three and four, 2-1/2" x 5/8". Both trusses have diagonal counter braces of 7/8"-diameter rod with loop-welded eyes, 1-1/4" upset threads, and turnbuckles. Single counters are located in panels three and four of both trusses, and doubled opposing counters brace the center panel of the south truss. Hip-verticals consist of a single 3" flat bar with loop-welded eyes, 5/8" thick on the north truss and 3/4" thick on the south truss. The hip-verticals are pinned with 3" pins to 1" U-bolt beam hangers which carry the floor beam. Bottom chord and floor beam pins are 3" on both trusses. Top chord pins could not be measured.

Portal struts, upper laterals, and sway bracing are identical on both trusses. Portal struts consist of a triple-intersecting Warren truss girder, 22" high by 6-1/4" wide. Top and bottom flanges are riveted T-sections, measuring 6-1/4" x 3", built of 3" angles. Webbing consists of 1-1/2" x 3/16" lattice bars. Upper lateral struts and sway struts are 6" x 3" inverted riveted T-sections. Upper lateral bracing rods are 7/8" in diameter with threaded ends. Sway bracing consists of two opposing 7/8" rods with turnbuckles which connect the upper lateral struts and the sway struts. The resulting sway frames are 9' high. The north truss has a vertical clearance of 19' 7" at the portal and 19' 2" at the sway frames; the south truss has a vertical clearance of 21' 7-1/2" at the portal and 21' 5" at the sway frames.

Both trusses have identical floor systems which were repaired or replaced at some time. The floor beams are 15" x 5-1/2" rolled I-beams, stamped "Carnegie," and suspended from the bottom chord pins with 1-1/8" U-bolt hangers. The floor stringers are 10" x 4" rolled I-beams, six in number, spaced 24" on center, and welded to the floor beams. Bottom lateral bracing rods are of three sizes—7/8", 1", and 1-1/8"—with a loop-welded eye on one end and the other end threaded. Bottom lateral connection to the floor beam is made with double angle brackets riveted to the beam, spaced and bored to accept a pin for the eye-end, and corner chamfered to accept washer plates and hex nuts to secure the threaded ends and allow adjustment.

The two trusses are carried by three piers, each consisting of two riveted steel, concrete-filled cylinders which rest on footings 8' in diameter (VDOT 1971:n.p.). The piers vary in height north to south and extend approximately 39', 45', and 42' above their foundations, respectively. The cylinders are 5' in diameter rolled from 1/4" plate, 54" wide, with overlapped riveted joints (Figure 4). The cylinders are spaced 15' apart on center, interconnected by bracing consisting of struts and diagonal tie-rods. The top strut is a 10" I-beam, welded with brackets to the steel cylinder, suggesting that it is a later repair. The lower struts are built-up box sections, consisting of 6" x 1-3/4" side channels and lattice-bar webbing. The diagonals are 1" rod with

loop-welded eyes and turnbuckles. The diagonals attach with pins and riveted plate and angle brackets directly to the steel cylinder just under the top strut, and with pins directly to the lower strut.

The fifteen deck beam spans vary in length: thirteen spans are between 19' 3" and 20' 2" long; one span is 14' 5"; and one span is 17' 6" (Figures 5 and 6). Each of the spans consists of eight I-beam stringers, measuring 10" x 6" and spaced 22" on center. The stringers rest on 12" x 5" I-section floor beams, stamped "Jones and Laughlin," reinforced with 1/4" strengthening plates welded to the top and bottom flanges. The floor beams are supported by two riveted lattice-bar posts, each 12" x 5" overall. The posts consist of two 5" x 1-3/4" channels with flanges turned out, connected with single 1-1/4" bar lattice. Each set of posts, called a bent, is cross-braced with 3/4" rods with turnbuckles. The posts rest on square concrete footings, which vary in size depending on the height of the bents.

The south abutment is straight and concrete, and measures 17' x 30" x 3', with a dropped beam shelf to carry the end floor beam. The north abutment consists of a straight concrete backwall, 17' wide, 8" thick, and approximately 3' high, with two 18" square concrete footings which carry the end floor beam.

The bridge decking consists of 4" x 10" pressure-treated wood planks, coated with asphalt and attached to the stringers with carriage bolts and deck clips. The roadway is 11' wide and edged with 4" x 6" wood curbing raised 4" off the decking with wood blocks spaced approximately 4' on center. The bridge railings consist of a single 3" x 10" wood plank running horizonal 36" off the deck.

A builder's plaque is located in the center of the portal bracing and reads:

Brackett Bridge Co.
Builders
Cincinnati O.

HISTORICAL INFORMATION

Background

Mansion Truss Bridge is located on the site of a covered wooden bridge and an earlier ferry. From the initial period of settlement until the mid-twentieth century, this area was associated with the Ward family.

John Ward, who had married Anne Chiles, migrated with the Chiles family into the Staunton River Valley in the 1750s. He held various public offices, including justice of the peace and captain of the county militia. In 1760, he and Benjamin Clement laid out a road from John Ward's mill near the mouth of Chiles' Creek to the Pocket Ford (Clement 1964:64-65).

In 1762, the Halifax County Court granted John Ward a license to operate a ferry from his landing on the Halifax County (now Pittsylvania County) side across the Staunton River to other land owned by Ward on the Bedford County side (now Campbell County). This ferry probably operated near the site of the present Mansion Truss Bridge. Soon after the license was granted, Ward established his permanent home in Campbell County on the high bluffs between the Otter and Staunton rivers on land inherited from his father-in-law. The house, known as "The Mansion," gave the area its name. It was destroyed by fire in the mid-twentieth century (Clement 1964:66-67).

During the Revolutionary War, John Ward was promoted to the rank of major in the county militia and became known by that title until his death in 1816 at the age of 105. During his lifetime, John Ward acquired many plantations on both the Campbell and Pittsylvania sides of the Staunton River. He also operated gristmills and a tavern. The site of the tavern is located on Pittsylvania County Road 633 near the Mansion Truss Bridge. John Ward [Jr.] obtained a tavern license in 1805; however, the tavern's operation may predate the license, as his father had owned the 391-acre tract on which it sat since 1772. Part of the tavern was torn down in the 1850s and replaced by the plantation house known as "Locust Hill." Another section of the tavern was incorporated into outbuildings at Locust Hill (Clement 1964:71; Fitzgerald and Hurt 1967:81; Historical Committee of the Bicentennial Commission of Campbell County, Virginia 1976:133).

John Ward was probably responsible for laying out the road (conforming to the present alignments of State Highway 29 and County Road 640) from Lynch's Ferry (presently Lynchburg) on the James River south to his ferry on the Staunton. Before the arrival of steamboats and railroads to the area, Ward's Road was the primary route used to haul tobacco-filled barrels from plantations in Halifax, Pittsylvania, and Bedford counties to Lynchburg for shipment to Richmond. During the eighteenth century, Ward's Road was called "the roaling road" because hogsheads of tobacco were rolled along it to their destination. Poles were run through the center of each barrel and then hitched to a draft animal (Clement 1964:68).

In 1842, a 75-mile-long turnpike was chartered from Danville to Lynchburg, which crossed the Staunton River over Ward's Bridge, where it entered Ward's Road and continued on to Lynchburg. The turnpike was known as the "Stage Road" because a stagecoach made a daily trip between the two cities, carrying passengers and mail (Clement 1929:241).

In 1810, John Ward petitioned the state to allow him to build a toll bridge across the Staunton River (Clement 1929:134). This may have been the covered wooden bridge which spanned the Staunton River at this location during the Civil War. Retreating Confederate soldiers burned down the bridge to delay the pursuit of the Union army. It is believed that the Confederates buried a cannon on the Campbell County side of the bridge, where the railroad right-of-way presently passes. After Ward's Bridge was burned, the nearest bridge was at Altavista, but a ferry was reestablished near the site of the burned bridge (Pittsylvania County Court Case *Thomas S. Shields and Homers S. Davis* vs. *Samuel M. Stone and Henry W. Adams*, November Term 1868; Popek 1984:144).

The present Mansion Truss Bridge was built in 1903. The process resulting in its construction was initiated by Pittsylvania County's Board of Supervisors in 1899. It was felt that the construction of a bridge on Ward's Road would improve travel between the county seat of Chatham and Lynchburg. The Board of Supervisors appointed a committee to view the former site of Ward's Bridge; find out if it was for sale and for what price; and then solicit half of the construction costs from the Campbell County Board of Supervisors, the Lynchburg Board of Trade, and the Lynchburg Chamber of Commerce (Pittsylvania County Board of Supervisors Minutes 4:121). The Campbell County Board of Supervisors, however, was not formally petitioned for a new bridge until September 1901. J.B. Stone, one of the Pittsylvania County Bridge Committee members, was chosen to work with a Campbell County commissioner to solicit bids for either an iron or a wooden covered bridge. Stone was also commissioned, along with W.T. Wilson and J.W. Fuller, to draw up plans and specifications for two such bridges (Campbell County Supervisors Order Book 2:358; Pittsylvania County Board of Supervisors Minutes 4:250, 266).

The bridge commissioners drew up plans for a steel bridge rising 40' above low water mark with three stone piers and either steel or wooden approaches. Campbell County promised to contribute $1,500 toward the construction costs of the new bridge. Pittsylvania County appropriated $6,000 out of its 1902 tax levy for the bridge. After Lynchburg citizens had agreed to contribute the remainder of the necessary funds, the bridge was put out for bid (Campbell County Supervisors Order Book 2:368; Pittsylvania County Board of Supervisors Minutes 4:275).

The Brackett Bridge Company of Cincinnati, Ohio, was chosen to construct the bridge. They proposed to build a steel bridge 40' above low water mark with three sets of steel piers and steel approaches for $7,980. Pittsylvania County agreed to contribute $5,874; Campbell County, $1,500; and the remaining $606 was to be raised by private subscription from Lynchburg's citizens. Pittsylvania and Campbell counties hired C.L. DeMott, a civil engineer, as a consultant on the project. He suggested that the Brackett Bridge Company strengthen the bridge further by increasing the tonnage of metal, which cost an additional $247 (Campbell County Supervisors Order Book 2:394; Pittsylvania County Board of Supervisors Minutes 4:284).

On September 1, 1903, J.B. Stone reported that the bridge was under construction and was expected to be completed within six to eight weeks. Three months later, representatives of Pittsylvania and Campbell counties examined the bridge with engineer C.L. DeMott and officially accepted the bridge (Campbell County Supervisors Order Book 2:416; Pittsylvania County Board of Supervisors Minutes 4:350).

On three subsequent occasions (August 24, 1909; December 9, 1912; and May 17-18, 1915), it was noted that the "bridge over the Staunton River on Wards Road" was in need of repairs and/or painting. Campbell County and Pittsylvania County shared the costs of maintenance. In 1919, Campbell County requested the State Highway Commissioner to take over the maintenance of certain roads and bridges, including the bridge over the Staunton River (Campbell County Supervisors Order Book 3:146, 282, 406; 4:23).

The Parker Truss

The Parker Truss was introduced by C.H. Parker in the 1870s. Parker utilized a quadrilateral truss of the Pratt type with posts in compression and diagonals in tension, but varied the length of the posts based on the strains on them at a given location. The center panels, where the strains were the greatest, required the tallest panels, with the posts getting successively shorter toward the ends of the bridge. The primary advantage of the design was a reduction in the weight of the bridge, or dead load, allowing for greater spans without increasing the sectional area of the bridge's structural members. A savings in material cost was a direct result; however, this advantage was largely offset by the cost of having to fabricate a greater variety of members. The most economical compromise was struck with a modification of the design that limited the number of variations in the slope of the top chord to three, for a total of five polygonal segments. This variation of the Parker truss is called a Camelback truss. In general, the Parker or Camelback truss becomes economical for bridges over 160' long (Comp and Jackson 1977:5; DuBois 1900:58-59; Kunz 1915:170; Waddell 1916:24)

Steel Cylinder Piers

According to John Waddell, a preeminent authority on bridges in the early twentieth century, concrete-filled steel cylinder piers "used to be the most common kind of pier in America" (Waddell 1916:1025). Riveted cylinder piers were the predecessor of modern pipe piers, which remain in high usage. The cylinders were originally constructed of cast and wrought iron, followed by steel after about 1890. Iron or steel sheets, from 3/8" to 5/8" thick and between 4' and 8' wide, were rolled into cylindrical sections varying in diameter from 4' to 15'. The cylinder ends were overlapped several inches and joined with rivets. The cylinders were joined end to end to achieve the desired pier height. The seams were riveted and usually overlapped,

although butt seams with an internal riveted band were used when higher compressive strength was required. When the piers rested on rock, they were anchored by drilling the rock and grouting-in steel rods to project up into the concrete in the cylinder. When piers were to be placed on soft bottoms, several wood pilings were driven in a tight cluster to project up into the cylinder. Tall piers or piers carrying extreme loads often rested on footings constructed of concrete-filled cylinders two or three times the diameter of the pier (Mitchell 1937:339-341; Waddell 1916:1025).

The Brackett Bridge Company

The Brackett Bridge Company began in Cincinnati, Ohio, as the Lomas Blacksmith Shop, established in the mid-1870s by William Lomas. In 1878, the Cincinnati city directory listed the business as "Wm. Lomas & Co., 21 West Second Street," engaged in the manufacture of tools and vices. The name changed to Lomas Forge and Bridge Company in 1880 as the company redirected its manufacturing efforts to bridges (Miars 1972:21). In 1890, F.J.P. Brackett, the shop superintendent, bought controlling interest of the company and changed the name to the Brackett Bridge Company. The company closed its doors sometime in the mid-1920s (Darnell 1984:48)

According to *A Survey and Photographic Inventory of Metal Truss Bridges in Virginia, 1865-1932*, a study conducted by the VDOT Research Council in 1973, the Brackett Bridge Company built a total of ten truss bridges in Virginia: seven in the Staunton VDOT Construction District, two in the Culpeper District, and one in the Lynchburg District (Deibler 1973). Two other Brackett Company bridges, Carpenter's Ford Bridge (VDOT Bridge No. 6147) and Christian's Creek Bridge (VDOT Bridge No. 6027), both in Augusta County, are included among the seventeen historic metal truss bridges recorded by VDOT in 1993-1994, of which this report is a part.

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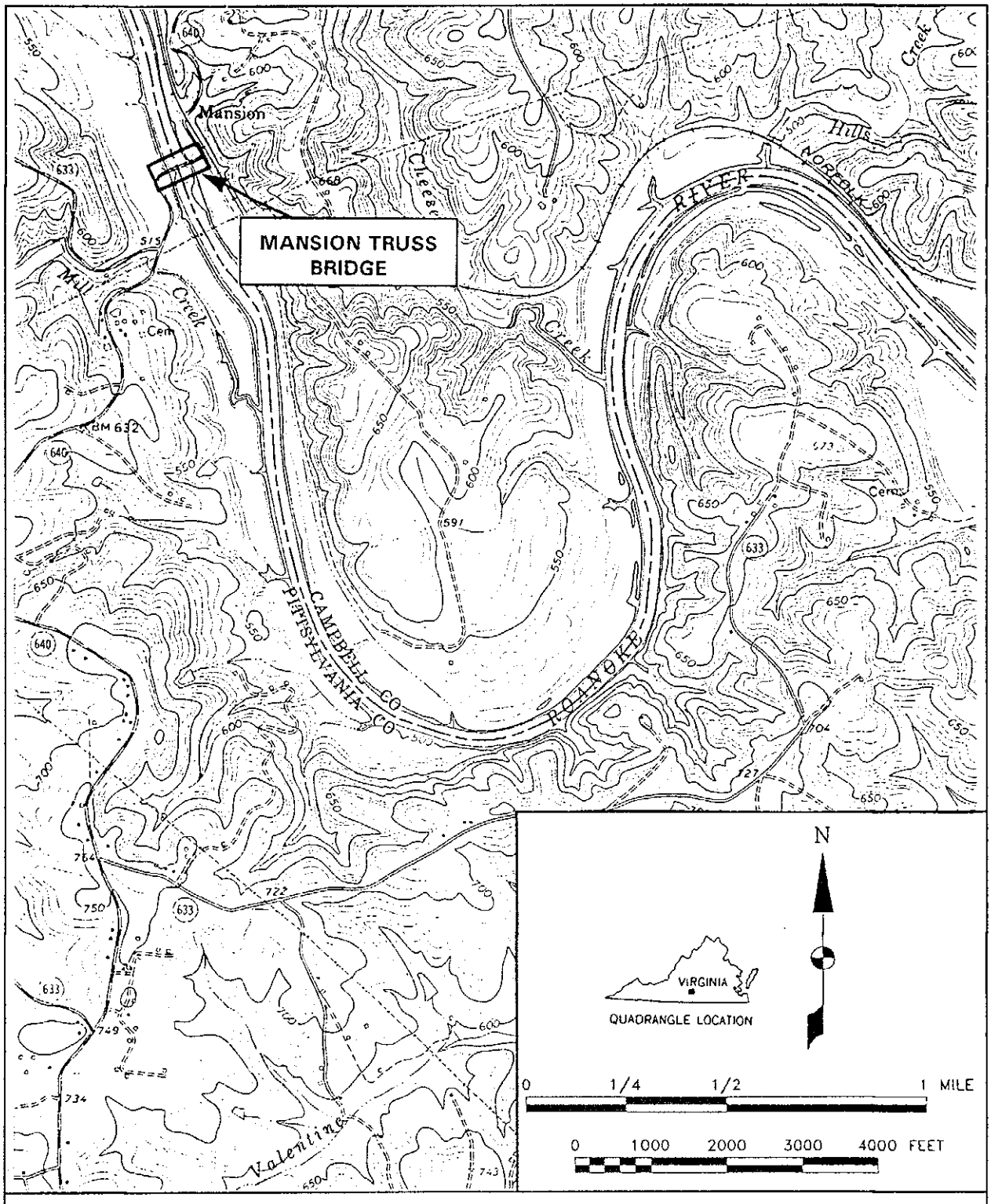

FIGURE 1: Location Map

SOURCE: USGS Straightstone, VA, 7.5 Minute Quadrangle, 1966 (Photoinspected 1982)

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FIGURE 2: Original Bridge Report, Bridge No. 6904, November 4-5, 1971 SOURCE: Virginia Department of Transportation 1971

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FIGURE 3: Original Bridge Report, Bridge No. 6904, November 4-5, 1971

SOURCE: Virginia Department of Transportation 1971

DIMENSION SHEET

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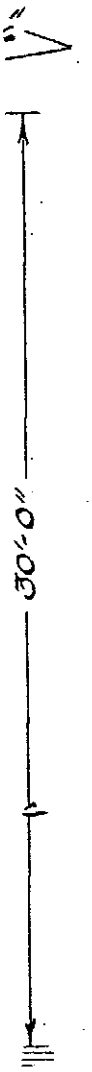

(Not to Scale)

FIGURE 4: Original Bridge Report, Bridge No. 6904, November 4-5, 1971 *SOURCE: Virginia Department of Transportation 1971*

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SOURCE: Virginia Department of Transportation 1971

FIGURE 5: Original Bridge Report, Bridge No. 6904, November 4-5, 1971

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SOURCE: Virginia Department of Transportation 1971

FIGURE 6: Original Bridge Report, Bridge No. 6904, November 4-5, 1971